DESCRIPTION OF A FARM

IN THE

KINGDOM OF POLAND,

CULTIVATED CHIEFLY FOR THE

PRODUCTION OF SEEDS

OF

IMPROVED

Agricultural Crops,

WRITTEN FOR THE

World's Columbian Exposition at Chicago,

BY

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DAŃKÓW.

Postal Station: MOGIELNICA,
Government of Warsaw,
Russian Poland.

AWARDS.

For the cultivation and improvement of Agricultural Crops, the Dańków Farm has arrived at results which brought it the very highest distinctions at the Shows in Warsaw (which is the only place where the Seeds of this Farm have as yet been exhibited), viz.:

In the Year 1887—

(1) **Diploma of Merit** (higher Award than Gold Medal), for the general production.

(2) **Silver Medal**, for Potatoes.

In the Year 1890—

Silver Medal, for Sugar-Beet Seed.

In the Year 1892, the following Highest Awards—

(1) **Diploma of Merit** (higher Award than Gold Medal), for the general production of Seed-Corn.

(2) **Special Diploma of Merit**, for Sugar-Beet Seed.

(3) **Large Silver Medal** (highest Award given for Wheats), for Dańków Selected Puławka Wheat.

(4) **Silver Medal** (highest Award given for Ryes), for Dańków Selected Schlanstedt Rye.

I.

GENERAL SKETCH

OF THE

DAŃKÓW FARM.

The estate of Dańków is situated in Russian Poland in the Government of Warsaw, in the district of Grójec (in the parish of Błędów); the postal station is Mogielnica.

The nature of the soil and sub-soil of the Dańków fields varies considerably according to their situation. The majority of the fields are situated high, and those have a thick yellow fairly permeable clay subsoil, which is covered with a rather thin, somewhat lighter layer on the more level tracts. On steeper slopes, the surface soil consists of this clay, but in the fields, which are declivous to a lower level on these lower tracts, as also in the fields adjoining the meadows, but slightly higher than them (with the exception of small bits of meadow land), the soil is only light alluvial.

The tracts of land lying above the slopes and composed of clay are the most fertile, on which all crops, even sugar-beetroot, flourish, and those tracts chiefly constitute the arable land of Dańków. The tracts which are situated below the slopes on which the clay is on the the surface, are considerably lighter and less even, and those produce good crops of rye, potatoes, carrots, etc.

With a few exceptions, the slopes are not steep, and are mostly declining southwards.

The farm buildings (chiefly built of brick) consist of: Two larger cowsheds, and one smaller for young cattle and for cows belonging to the labourers; stables; granary; three barns, one of which contains a thrashing machine and a chaff cutter.

Besides these, the building next to my residence contains a laboratory for purposes of selection, the drying ovens and baths of which are heated by steam conveyed from the boiler, which also serves at the same time for steaming potatoes and lupine (with the object of freeing it of its bitter taste).

In an opposite building are the store rooms and loft, used for keeping little sheaves of corn from the nurseries.

The working live stock consists of 24 horses and 16 oxen.

The number of permanent labourers is 12, who are paid partly in corn, wood, potato land, etc., on condition that they supply the farm with one male or female day labourer; in addition to these, 8 labourers are permanently boarded. Except these, several families are kept, who are bound also to work every week day on the farm, for wages which are deducted for one day's work per week, for which they get from me about an acre of potato land, lodging, and fuel. Then several artisans are kept on the estate, also a blacksmith and a night watchman.

The annual remuneration of these labourers who are partly paid in corn, etc., amounts to: Salary, 20 roubles;* corn, 4 quarters and 1 bushel, and an additional 3 bushels for milking the cows; potato land, 2½ roods, and for milking cows, one additional rood; wood (for fuel), 8½ loads.

The price of day labour in winter months amounts to: 15 kopecks† per day for male, and 10 kopecks for female labour. In spring, 20 kopecks for male, and 15 kopecks for female. During harvest, for male and female, 30 kopecks, and during digging, 20 kopecks per day.

A great deal of work is done by piece-work at the following rates: For mowing 75 kopecks per morga;‡ for digging out potatoes, carrots, etc., 5 kopecks per ridge about 5 chains long (which equals to about 5 roubles per morga.) For lifting, trimming, and cleaning beetroots ready for the sugar factory, about 6 roubles per morga. For the first hand hoeing of beet, about 1 rouble per morga; for the second, together with thinning, from 1·20 to 1·80 roubles per morga; for the third, 1·20 roubles per morga. For cutting lupine and binding in sheaves and setting in small stooks (of 12 to 15 sheaves each), 1·35 to 1·50 roubles per morga. For spreading farmyard manure, from 30 to 40 kopecks per morga.

The object of this piece-work is not only to encourage the labourer to work more industriously, but also to enable the labourers' wives to earn something (whose household occupations prevent their working a whole, or even half a day on the farm.)

Permanently, there are 30 to 40 hands employed on the farm. Besides these, during planting, sowing, harvesting, and digging, more labourers are engaged from neighbouring villages, or even from other districts, especially during digging time, when the number of labourers on the farm increases by one hundred. The day labourers' account amounts in all to 2,700 to 3,000 roubles per annum.

The farm is managed by me with the assistance of a bailiff, two foremen, gardener, and a dairyman, who also has the charge of the granary, and does some clerk's work in addition to managing the dairy (which is fitted up with Laval's large cream separator, Lehfeldt's churn, etc.)

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* The present exchange value of one paper rouble of 100 kopecks† = 52 cents.

‡ One morga = 1·38353 acres.

II.

THE ARABLE FARM.

1.—*The Production of Plants.*

This is directed with the object, firstly of producing selected seed corn and seeds of some roots, and secondly of producing sufficient forage for maintenance of the dairy farm and thereby also of producing a good farmyard manure.

For this kind of cropping, the state of cultivation of the land has naturally to be improved as much as possible.

The dairy farm at the same time turns into money a considerable quantity of potatoes which occupy corresponding areas in the rotation fields.

In order to attain these objects, two rotation courses have been adopted :

The principal one, comprising mostly the clay soils (situated above the slopes) consists of 15 fields of 55 acres each, and has the following course :

A. FIFTEEN COURSE ROTATION.

1st	Year.	Sets of root crops.
2nd	,,	Winter corn, with clover.
3rd	,,	Clover.
4th	,,	Winter corn.
5th	,,	Fallow.
6th	,,	Winter corn.
7th	,,	Roots.
8th	,,	Spring corn with mixed clover.
9th	,,	Clover.
10th	,,	Pasture.
11th	,,	Winter corn.
12th	,,	Roots.
13th	,,	Spring corn with seeds.
14th	,,	Pasture.
15th	,,	Winter corn.

The second course of rotation is a small one, and comprises the lighter soils (situated below the slopes) and consists of four fields of 19 acres each :

B. FOUR COURSE ROTATION.

1st Year.	Potatoes.
2nd ,,	Ornithopus sativus Brot.
3rd ,,	Lupine.
4th ,,	Rye.

In addition to these, a free course of rotation is carried on, on an area of 55 acres near the homestead. It comprises chiefly forage plants and nurseries of root crops and their sets.

The winter corn is the safest crop on the land of that neighbourhood. Therefore, also, the course of rotation A devotes it the most space, having under its cultivation one-third of the total area of the course. The rotation of the winter corn in this course is a suitable one, as is also that of the spring corn which follows roots, after which the clover has a well prepared and clean land.

The red clover grows very luxuriantly after sets of root crops on land well fertilised with phosphoric acid, which here, however, has no effect on grain crops. When the aftermath of this clover has been mown, and the land ploughed immediately after, it yields rather good wheat without the use of manure.

2 *Mechanical Cultivation of the Soil.*

For ordinary ploughing the Wrzesińskie ploughs (made in the workshops of the farm) are used, and which, owing to their light weight, cheapness and durability, seem to be most suited for this land, which is not free from stones.

For autumn ploughing under sets of sugar-beet and carrots, subsoil ploughs of the Hohenheim system are used. Of cultivators, two kinds are used, the heavy triangular and the lighter so-called Silesian. Harrows of the Scotch type, with iron teeth, and also light wooden and brush harrows, are used. Of rollers, the fluted press wheel double roller and the smooth roller (which is made of oak) are used. The ridging ploughs and horse hoes are made in the workshops of the farm, like most implements, and the last are of the English type with a slight modification which enables the soil to be stirred deeper in the furrow, which, owing to the closeness of this soil, seems necessary.

The ploughing (except the grubbing) is performed to the depth of 5 to 6 inches ; but for some root crops the autumn ploughing, together with the subsoiling, loosens the soil 11 inches in depth. For winter-corn on the fallow and on the temporary pastures mostly, three ploughings are performed which are alternated with harrowings, and in very wet seasons, if necessary, also with cultivatings. Before sowing in dry weather, the harrowing is done immediately after the last ploughing, so as to prevent clodding of the soil.

As soon as the aftermath of the annual clover has been mown, the green manure is ploughed in for winter-corn, and then in dry weather, the fluted press wheel double roller is used for pressing down the land. This roller is also used in the spring, during the preparation of the land for beetroot, for pressing down the ploughed and harrowed land, prior to the ridging.

After rolling, one more harrowing is done with a wooden harrow. In general care is taken that shortly after rolling, the harrow should be used so as to prevent quick drying up of the soil.

After the sowing of clover and seeds with the spring-corn, and after the light harrowing has been performed, the smooth roller is used, and then brush harrowing is generally done.

3. *Chemical Cultivation of the Soil.*

All the produced farmyard manure, from about the 1st of July until winter, is strewn over daily with superphosphate, of which, in 120 days, about 200 cwts. are used, viz.—as much as the course of rotation **A** requires for the sets of roots, allowing about 3⅔ cwts. per acre. All this farmyard manure is carted out on the land for the root sets, on which, in the spring, 2⅙ cwts. of nitrate of soda is added per acre.

The total quantity of farmyard manure produced during winter and spring is carted out, after the spring sowing is finished, on the land for winter-corn, commencing with the fallow (which, after having been ploughed in with the manure, is usually sown over with blue lupine with the object of being ploughed in again) and finishing with the temporary pastures. In this way the winter-corn is spared of having the manure directly applied under its root, which used to be the case before the cultivation of sets of root crops was introduced, and which promoted the growth of weeds.

The manure is kept under the stock; only the stable manure is carted out to the cowshed. At the end of the winter months part of the cowshed manure is carted out through necessity, owing to the height of the buildings not allowing the manure to be kept until the middle of May as the layer of manure cannot be kept higher than 5 feet. Formerly the manure used to be carted out into the fields in February and March; but since five years, after having experienced losses of the valuable manurial ingredients, a different method has been adopted. In order to make room in the cowsheds, part of the manure is carted out in February to a roofed-in shed, where the manure is mixed with layers of peat, with which it is thickly covered over, and in this way a compost is formed which is carted out to the nearer fields.

The manure which is carted out into the fields in its proper time, is spread with pitchforks immediately after it has been unloaded. The total quantity of farmyard manure produced is about 3000 large loads per annum. The average quantity of manure applied to the acre is 13 large loads.

In the **B** course of rotation on the lighter soil, peat is used as a fertiliser, and is carted out in winter from the adjoining meadows; in spring potatoes are planted, then Ornithopus sativus Brot. or lupine for forage or seed, then lupine for ploughing in as green manure.

Into the fields adjoining the homestead, on which the course of rotation is a free one, the farmyard manure is carted out, according to requirement, for maize and the nurseries of sets of root crops, in addition to which superphosphate, nitrate of soda, and marl are applied as auxiliary manures.

Sugar-beet during their vegetative year do not receive farmyard manure, but they are sown in the second year after it has been applied; however the land is well fertilised in the spring with about 4⅓ cwts. of superphosphate, and about 2½ cwts. of nitrate of soda per acre. Two thirds of this artificial manure, after it has been thoroughly mixed together, is strewn over the ploughed land, which is then harrowed in order to mix the manure with the soil, and is then ploughed 6½ inches deep. The remaining one third of this artificial manure is applied as top dressing prior to ridging.

All the superphosphate is prepared at home; the coal dust, (which is bought at the sugar factory of Czersk) is steeped in sulphuric acid dissolved to 52° (Baumé's). The proportion of this acid applied with unused coal dust is 39%, and with used coal dust, which contains more carbonates, 50%. This manipulation takes place in a specially built pit. A hundredweight of such a superphosphate (14%) is here not more expensive than a hundredweight of basic slag (18%), and therefore, being more effective, pays better.

So much about the chemical cultivation of the soil. Now we pass to the distinct speciality which is the chief feature of the Dańków farm.

III.

THE PRODUCTION of SELECTED SEEDS

OF

CEREALS AND ROOT CROPS.

I have devoted my attention to the improvement of agricultural plants at Dańków since the year 1880, when, after having perused Hallett's treatise, I undertook the improvement of the wheat Puławka (Kostromka) by means of selection of the best ears and their best grain and also by the system of cultivation adopted by this author, dibbling single grains at a distance of 12 × 6 inches.

In spite of having reduced the distance of the plants to one half in proportion to the one practised by Hallett, I have experienced a disappointment in the result of this work; though the ears and grain became larger, the last got grooved, thick skinned, of dark colour, and the straw became abnormal and crooked in its nodes, and betrayed a tendency to rust.

After gradual reduction of the distances of the dibbled plants; the experiments have led in the year 1886 to the adoption of the method of selection and cultivation, the results of which now prove to be very satisfactory. The description of this method is given below.

In the spring of 1886 the first selection of sugar-beetroot sets was performed in Dańków, which gave rise to the production of sugar-beet seed, and which now far outsteps the boundaries of Dańków, though still being under its sole direction.

A few years prior to this I have been producing selected green top white carrot seed for local use. As this seed gave good results, gradually the production was increased, and now there is a good demand for it, especially in the districts of Grójec and Rawa.

Besides seeds of winter-corn, sugar-beet, and carrots, which are all improved by means of a most careful selection, Dańków produces also seed tubers of potatoes of which the new kinds are imported from the original producers, then they are reproduced, compared with each other and with the old kinds, and those which compare favourably after experimenting, are recommended and supplied to a wide circle of agriculturists.

In this sphere I was obliged to limit my seed production owing to all my time being absorbed by the successive occupations and attentions which a culture of selected plants requires, and therefore I could not devote any time to the seeds of grasses and spring-corn.

My own experiments and those of most reputed foreign seed growers, have convinced me that improvements of agricultural plants cannot be effected by any artificial means, whether of mechanical or chemical nature, but only by means of selection of the favourably differing individual grown up under conditions most similar to those under which the plant is intended to multiply.

The choice of the soil for the so called nurseries, which here are laid out in the fields, and are removed from one place to another; as well as the tillage of this soil, and also the whole system of the rearing of crops are directed towards *producing a selection of the plants which are made subject to uniform conditions, differing as little a possible from those usually found in the cultivated land of our farms.*

In order to attain this important object of uniformity, and at the same time to avoid in the corn nurseries the dragging of corn seeds with the manure, which would naturally be misleading, the farmyard manure is not applied directly to the nurseries, which are laid out in a cultivated field the second year after it has been well manured under sugar-beet and moderately under carrots, with superphosphate and nitrate of soda. The whole aim in cultivating the land for corn is to attain that happy medium, in which their growth is neither stunted nor too exuberant. The care attached to the rearing of crops in the nurseries is practically limited to the same amount as to that for corn grown on a large scale in the fields, and so for example with wheat, one weeding is done without any stirring up of the land. Under such conditions the selection of the most perfect individual plants takes place first in the field, then a stricter selection is performed with the aid of some instruments (scales, polarimeter, etc.) in the laboratory.

The best selected seed from the choice individual plants is obtained every year for sowing on the Dańków land, and the reproduction of that seed is sold (first reproduction of sugar-beet seed and carrot seed; and third of seed-corn).

Now we pass to the description of the method adopted for the rearing of improved corn crops.

A. IMPROVEMENT OF THE NATIVE VARIETIES OF GRAIN CROPS.

This will be best explained by the full description of the system which is applied to the improvement of the Puławka wheat (formerly called Kostromka) which was commenced here, as mentioned before, in 1880.

The original method of Hallett's was discontinued and in 1886 the rearing of improved corn crops was again commenced, according to a local and now established method.

In that year in a field of 55 acres of Puławka wheat, several hundred typical plants were picked out which differed favourably from the rest by their ears being thick set and by the stoutness of their

FAMILIES OF SELECTED PUŁAWKA WHEAT.

YEAR 1890.

1	2	3	4	5	6	7	8	9	10	11	12	13					
Family marked with a number or letter :	Rows planted and harvested.	Yield of grain. lbs.	Productiveness expressed: 1,000 × yield / Number of rows. lbs.	Productiveness expressed in Korzec.* Per morga.†	Of all grains after having been removed off the chaff.			Colour of the Chaff.	Resistance against lodging.	Resistance against rust expressed in Figures from I. to V.	REMARKS.	Categories.					
					Weight of hectolitre Kg.	Colour expressed in figures from I. to V.	Absolute weight judged by the eye, and expressed in Figures I. to V.					I.	II.	III.	IV.	V.	VI.
KB.	34·7	2·8	80·7	16 953	78.2	IV.	V. (100 grains = 4·33 gm.)	White, with a slightly pinkish tint. Awns longer than with others.	Bent.	III.	Rust on the chaff.	—	1	—	—	—	—
KB. No. 2	4·4	156 gm.	86·36	18·15	—	IV.	V.	Do.	Do.	III.	Do.	—	1	—	—	—	—
KB. No. 3	5·4	200 gm.	90·79	19 07	—	IV.	V.	Do.	Do.	III.	Do.	—	1	—	—	—	—
KB. No. 4	3·7	135 gm.	90·96	19·10	—	IV.	V.	Do.	Do.	III.	Do.	—	1	—	—	—	—
KB. sl.	26 9	1·9	70·6	14·83	76·6	III. ½	III.	Do.	Do.	II.	A great deal of rust on the chaff and the straw.	—	—	—	—	1	—
I. 1a	30·0	2·0	66·6	13·99	77·8	—	-	—	Upright.	Healthy	Ears degenerated ; had to be rejected.	—	—	—	—	—	1
I. 3	30 0	2·6	86·6	18·19	80 0	III.	IV.	White with a reddish tint.	Lodged.	IV.	Considerably healthy in the straw.	—	—	1	—	—	—
I. 5	12·9	1·0	77·5	16·28	80·0	IV.	IV.	Do.	Bent.	II.	Straw very rusted.	—	—	—	1	—	—
I. 5b	Rejected in the field, having become degenerated similarly as I. 1a.											—	—	—	—	—	1
I. 7	37·0	2·7	73 0	15·34	79 0	III.	IV.	White.	Lodged.	III.	Straw rusted.	—	—	—	1	—	—
I. I.	55·0	5·5	100·0	21·01	78·6	III. ½	V. (100 grains =4·55 gm)	White, with a slightly reddish tint.	Upright.	IV.	Early eared and ripened.	1	—	—	—	—	—
II. 1	24·0	2 2	91·7	19 26	79·5	II.	II. (100 grains =3.55 gm.)	Light coloured.	Very much lodged.	IV.		—	—	—	1	—	—
II. 4	32·0	2·7	84 4	17·73	80·0	III.	III.	Almost white.	Slightly inclined.	IV.	Well developed ears.	—	—	1	—	—	—
II. 5	32·0	3·4	106·2	22·31	80·2	II.	IV. (100 grains =4·11 gm.)	White.	Upright.	V.	Late eared, but ripened as soon as the other families ; had best ears, the straightest straw, and was free of rust.	1	—	—	—	—	—
II. 6	25·4	2·3	90·5	19·01	79·6	III.	IV.	Do.	Bent.	IV.		—	—	1	—	—	—
II. 7	31·5	2·0	63·5	13·34	79·3	III.	III.	Grey.	Slightly bent,	I.	The straw and chaff extremely rusted.	—	—	—	—	—	1
II. 9	20·5	1·5	73·2	15·38	79·6	IV.	IV.	Light coloured.	Bent.	III.	The wet situation rather justified its worse state.	—	—	—	1	—	—
XW. Choice I.	75·6	6·0	78·0	16·39	81·6	IV.	IV.	White.	Bent a little.	IV.	On rather drier soil than the rest.	—	—	1	—	—	—
XW. No. 1	4·3	179 gm.	101·1	21·24	—	IV.	IV.	Do.	Do.	IV.	Do.	—	1	—	—	—	—
XW. No. 2.	5 85	134 gm.	63·6	13·36	—	IV.	IV.	Do.	Do.	IV.	Do.	—	—	—	—	—	—

* One Korzec = 2 bushels 3 pecks 1½ gallons, † One morga = 1.38353 acres.

straw. Then in a room the heaviest ears of these plants, and which were most filled with grain, were picked out (observing that the central part of the ears should contain most grain). From these central parts of the best ears were picked out the most beautiful grains (judging by the eye) according to their size, shape, and colour, and these constituted the beginning of the first nursery established on the new system.* Since then, to each plant, 10 square inches of space are allowed. The dibbling of single grains to equal depths and at equal distances apart, 4 × 2½ square inches, is performed by means of a board in which at equal intervals of 4 inches there are three rows of pegs driven in 2½ inches apart from each other. The labourer standing on that board puts the single grains into the several holes previously dibbled by the pegs, and at the same time in treading on the board he dibbles the land for the following operation: after a long space has been dibbled it is lightly raked over.

As the number of plants in a row and their distance from one another are always the same, the number of rows serve as measure of the area in comparing the yields, the varieties, or the categories and families of one variety.

Every nursery of winter corn is enclosed by a border of oats sown in spring.

In the following year, 1887, from a nursery arranged as above, the finest plants were picked out (excluding from the choice the border plants) observing their health, thickness of straw, size and fulness of ears, Of these plants dug out with their roots, 93 of the best ears were selected (judging by the eye) then in the laboratory they were separated according to their weight, marking out:

15 of the heaviest ears and containing fine grain (above 3·7 grm.) for sowing in the nursery (each ear separately); 18 ears (each weighing 3·3 to 3·7 grm.) were mixed and sown in the nursery as choice I. The rest of the ears together with the remaining ears of the selected plants, as choice II have been marked out for multiplication.

Of the 15 best ears (to which in the following year six more have been added) separate families have been reared during a few following years, leaving always of each family the best specimens for further nursing. and selection, and the good ones have been marked out for multiplication, if the whole given family has proved worth it.

In order to test the power of resistance of the different varieties against rust, a plot of land has been laid out for the nursery for several successive years, near the homestead where lucerne used to grow formerly, and which used to be inflicted by this disease more than any other land on the farm. The year 1890 has been particularly suited for such a test, owing to the extensive rust which then prevailed. At the same time the soil in the nurseries (as was indicated by a row of one variety sown abreast having been made so even and owing to the complete lack of accidental damages, the results of that year serve as a better criterion than those of other years. This consideration disposed me to quote these results lower down in the table comparing the researches of that year among the separate families of Puławka wheat, being convinced that these figures taken from actual experiment, apart from being interesting, will give a better insight into the system of specifying the relative value of complete families as applied at Dańków.

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* A stricter method of picking out the grains of corn by means of floating in solutions was tried, at first sodium chloride, then sulphate of magnesia (Epsom salts) being more soluble, were resorted to. This method has, however, been discontinued, being convinced that the emerging from the surface and the sinking of the grains is chiefly dependent on the size of the air bubbles to which they adhere, and those possibly could only be removed by means of a pneumatic pump. Though, then probably part of the intercellular air would also be removed by its use, and all the grains of corn would then ultimately sink to the bottom. Besides according to our opinions the proper weight of a grain of corn is not a standard of the weight of a corn measure, say a bushel (by which also the corn dealers estimate the value of corn). The weight ot a bushel is dependent more on the shape and roundness of the grains (which accordingly pack tighter or looser) than on their individual weight.

In the foregoing table the first column contains the names given to the separate families (in order to be able to distinguish them) either marked with numbers or with letters. The second column states the number of rows in the nursery; in the third column is given the weight of the whole yield of the grain after it has been shaken out of the ears and removed. The fourth column indicates the proportionate weight of the yield in lbs. which a thousand rows would give. And as each thousand rows covers always the same area, the yield per "morga" can be very easily calculated, and having done this at leisure, the results are quoted in the fifth column.

The very high yields should not be astonishing owing to these having been obtained on small areas, which, if calculated proportionately on large ones, are of course, apt to be a little bigger than it would practically be possible to obtain on a large scale.

The sixth column quotes the weight of the hectolitre of these families, of which sufficient quantity (= ½ litre) has been harvested. Then the seventh contains the estimate of the colour judged by the eye, and numbered I. to V. (V. denotes the best colour). The eighth column indicates with numbers I. to V. the estimated thickness of the grain judged by the eye, in lieu of taking the absolute weight which has been done at first, but which proved to be unnecessary owing to the acquired facility by practising the present mode. Only in a few instances the absolute weight is denoted for the sake of verification, and in the eighth column four have been marked with their weight of 100 grains of corn taken at random, and without removing the light corn. All the denotements in general in the sixth, seventh and eighth columns are made, not in reference to the best selected seed corn which is picked out for further reproduction, but only to the remaining quantity of all the corn grains after these have been winnowed without the light corn having been all removed.

After having acquired some practice such a mode of specifying the relative value has proved to be less complicated and delusive than a separate valuation of the best selected seed corn and the light corn.

The eleventh column contains the denotements taken during the vegetative period, and ultimately during harvest time.

The lodging of some of the families took place rather late, so that the yield did not suffer. No measures have been undertaken to prevent lodging.

The twelfth column contains some remarks which were afforded by the state of the families as observed during vegetation.

Lastly, the thirteenth column indicates the total result of the specification of the relative value of the whole families by including them under the several categories relating to the rearing of the best plant from the best seed.

It is true that in order to determine which of the corn grains is the best, several years of work are required, the reward for which is the conviction that " all that glitters is not gold."

After one year's trial, not all the families are rejected which are not equal to the best, because some, though deficient in one point, are more efficient in another. However, the last two categories are quite excluded. The best specimens of the three first categories are further reared separately on the same system. The second selection of specimens of those categories as well as the best specimens of the fourth category give grain which, after being picked out by well practised girls, serves for multiplication on a large scale.

Every year 1 to 1½ pecks of such grain (of selected Puławka wheat) is being produced, which, with rather thin drill sowing, yield a year later 6 to 9 bushels of seed-corn of the first generation. This quantity is then sown with a broadcast corn sowing machine, on an area of about 5 acres, yielding grain of the second generation, which in the next, the third generation, produce seed-corn for sale.

The place of the rejected families is substituted by others, derived from the newly selected specimens from the nursery or field, and also from those obtained by way of crossing several families between each other.

According to this method, Puławka wheat is reared primarily at Dańków on a larger scale, because on that land this variety has always been the heaviest cropper, and has produced the finest grain.

Besides this, I occupy myself on a smaller scale with: Sandomierka, a red chaff wheat, originally derived from the Golden wheat; and also with the Square Head variety, which I am endeavouring to acclimatise, though so far with a doubtful result.

Its hardiness in bearing frosts has indeed been increased considerably, but it easily softens under snow, but what is still worse, it cannot bear our summer drought, which produces a grain which is not plump, and it seems that owing to selection in that direction, the shape of the ear degenerates, loosing its massiveness and square shape, from which the name of this variety is derived.

The rearing of rye is managed here so far differently from that of wheat, that through consideration of the necessity of that plant indicated by nature (the flowers of rye are never fertilised by their own pollen) needing new blood, as it were, to be introduced, no separate families are reared, but a selection is resorted to, having regard to the straw, the ears (according to weight) and the grain (according to colour, shape and size); occasionally opportunity is given for change of blood, as it were, by means of laying out another nursery close by, with the grain of selected specimens which are of a different extraction. And so, last autumn, next to the former selected rye, have been planted the selected specimens of Schlaustedt rye, with the object of improving the thickness of straw with the former, and the quality of grain with the latter.

Six years ago, the Probst rye has been alternated every second row with Zealand rye, and I endeavoured to retain, with the following selections, the intermediate type. The multiplication of the selected rye outside the nursery has only been commenced last year; therefore another year will have to pass before sufficient quantity of seed is produced for sale.

B. CREATION OF NEW VARIETIES OF GRAIN CROPS.

Since 1887 I am engaged on the Dańków estate with the improvement of the existing varieties of wheat, as well as with the creation of new ones by means of hybridisation, in the hope of producing through the crossing of native with the French or English varieties, of which the latter (the English) resist more the lodging, and owing to this are apt to produce larger yields on rich land, and the native can bear better our winters and summer droughts. Besides this advantage, I hope that the production of new varieties, differing with regard to their rooting, will enable us to obtain larger yields from the mixed sowing, which is recommended so much by Vilmorin, but for which at present we have too little suitable material.

For hybridisation the parent plants were sown in the midst of a field of rye, or in a sheltered part of the nursery, so as to prevent the wind from conveying strange pollen during the fertilising operation, for which I did not adopt Rimpau's method of transplanting the plants marked out for crossing into pots under glass, from fear that such treatment of the plant during the decisive moment of its life should not cause an irretrievable deficiency in its future generations.

The mechanical procedure of the cross-fertilisation as practised here consists in this: that after leaving on the axis of the ear only four rows of the largest (border) florets, numbering 12 to 18, the rest are cut off with scissors; then we deprive the flowers of all their anthers in the green state, removing with forceps the stamens; then the ear is covered with a little bag made of parchment paper, which is tied to the blade on cotton wool. Next day the pollen is transferred to the pistil either with the finger nail, with a little brush, or directly from a flowering ear which has been picked and warmed in the hand. This manipulation is repeated once more the following day, after which the ear is kept for a week under this little sheath, until the swelling of the fertilised pistils becomes visible. For safety sake in the next year the grain derived from the crosses is sown and grouped separately, as distinct from the individual plants; and then being dug out, the distinct families are removed in little sheaves.

The diversity of the shape of the ear in the second generation among plants derived of the same plant is for us the surest evidence of a cross-fertilisation having taken place. In a few cases where the diversity was absent the respective group has been excluded, because there was a suspicion of the cross-fertilisation having taken place.

The chief work begins with the second generation, which has for its aim to choose among the diversity of selected plants, and to establish a few promising types.

The results now arrived at lead me to hope that in a few years I will be successful in my endeavours. I have already in the nursery groups of crosses between Square Head wheat and Puławka which are hardy enough to bear our frosts, fairly uniform, with a closely set and square-shaped ear like in Square Head, though the grain is not of red colour as in the English variety, but is white or slightly vitreous-white.

Among the products of hybridisation which were obtained here, many have been rejected after their second generation ; among others, Champion with Puławka, Colossal Hybrid with Puławka, Michigan with Puławka, Short-eared Rough Chaff Michigan with Sandomierka. The last, though presenting no practical value, was interesting from a theoretical point of view. Its short ear, resembling that of the Oregon wheat, having been fertilised by the pollen of the Sandomierka wheat, produced in its next generation 17 plants exactly like the parent (female) variety, differing only in this : that during the snowless winter of 1888-89 not one of these plants perished, while not a trace remained of the Short-eared Rough Chaff Michigan (not crossed) which was sown on a larger adjoining plot.

One ear of this cross produced in the next generation in 1890 such a great variety of types as I have never noticed with any other cross.

The following are the crosses of wheats still left in my nurseries :—

1. Puławka ♀ × Square Head ♂ and Square Head ♀ × Puławka ♂

were crossed in 1887, of which three types are being established : first, like Square Head in its ear, but having a light coloured grain ; second, with a bearded ear ; third, with an intermediate ear between Puławka and Square Head, also with a light coloured grain.

2. Lamed ♀ × Puławka ♂

Crossed in 1887. Produced two types which are reared, and which by their shape of ear resemble Lamed. Their grain is white, but one has a red chaff, the other white.

3. Pulawka ♀ × Rough Chaff Oregon ♂

Crossed in 1887. Produced two types : one with rough chaff, and the other with smooth chaff. Grain large, oblong and white in colour.

4. Red Chaff Sandomierka ♀ × Square Head ♂

Crossed in 1888. Produced several intermediate types, with red and white chaff. Grain white, and also light coloured vitreous.

5. Puławka ♀ × Oregon I ♂

Crossed in 1889. Oregon I resembles the white Victoria wheat, and originates from a mixture of varieties contained in a sack of commercial wheat which Count Ludwik Krasiński has imported among other wheats from America in 1886 for the exhibition in the museum in Warsaw.

The type which is being established is the one the ear of which resembles that of Oregon wheat.

6. Puławka ♀ × Hallett's White Victoria Pedigree ♂

And the reverse cross.
Crossed in 1890.

7. Puławka ♀ × Blé Roseau ♂

And the reverse cross.
Crossed in 1890.

8. Puławka ♀ × Blé Seigle ♂

Crossed in 1890.

The year 1890 evidently favoured the unfrequent natural cross-fertilisation in wheat, perhaps owing to the strongly developed rust in the ears, which in some flowers might have damaged accidentally their stamens without destroying the pistils.

In 1891 I noticed for the first time among the nurseries specimens betraying natural hybridisation, which has been confirmed last year on two varieties by the heterogeneousness of forms (in the second generation) namely:

1. Blanc à Duvet ♀ × Puławka ♂

Though the Blanc à Duvet wheat was sown on a strip of land 73-ft. distant, and separated by six other varieties, its pollen fertilised in 1890 the floret of the Puławka wheat of choice family II., so that in its nursery was found one plant with rough chaff. Last year (1892) the grain of that plant produced ears of various shapes with rough and smooth chaff.

2. Square-head ♀
vel Blé Roseau ♀ }? × Puławka ♂

Has been likewise recognised in 1891 by the shape of the ears, and last year presented similar heterogeneousness of forms to those produced by cross-fertilisation of Puławka with the above varieties of wheat.

Then the third plant of Puławka, which was suspected in 1891 of having been crossed, and examined last year, appeared to have less heterogeneousness, though by its somewhat thicker and more closed ear it differed from the type of Puławka wheat, therefore probably this was a result of a spontaneous transformation. To the same category one will also probably be able to add numerous bearded ears which have appeared last year among Puławka wheat in face of circumstances which quite precluded the possibility of the plants having been mixed. Doubtless these types could be established, but they would not be an improvement for our (Polish) climate.

C. REARING OF SUGAR BEETROOT SEED

Is managed in a way analogical to that of wheat, only that like with rye, the nature of the plant is considered, which, in order to become fertilised, requires strange pollen. Therefore, also, the rearing of a family as a pure unmixed race is never managed for more than a few generations.

Here the system of specifying the relative value is more complicated and is assisted by more costly appliances and instruments (polarimeter, chemical balances, water-baths, drying ovens, etc.), with which the Dańków laboratory is equipped.

The determination of the percentage of sugar contained in the single sets of beetroots, is only effected by the direct method, mostly by means of alcoholic digestion.

From the best of the beetroots for seed, with a high polarisation, the roots are selected for production of seed of the very best class ("Supra élite") to form the material from which selection is made; but the seed of the next best selected roots ("Elite") serves for the production of sets of beetroots for the sale of their seed, which we also produce on several adjoining estates and other places in the Kingdom of Poland having a suitable soil. At present, the quantity of seed produced amounts to about 2,000 cwts. per annum, but I expect soon to greatly increase it, being encouraged by the most successful results attained, and especially by the fact that after the collective experiments carried on at the initiative of the Sugar Department of the Warsaw Society for Promoting Trade and Industry, on their 28 different experimental farms situated in the Kingdom of Poland and the Empire of Russia, **in the year 1892, the Dańków Sugar-Beet, owing to their saccharine strength, occupied the first place among all the competitive varieties of the leading German (including Gebrüder Dippe), Austrian, French (including Messrs. Vilmorin & Co.), and native seed growers.**

See No. 11 of the "Dodatek Cukrowniczy do Przeglądu Technicznego" for the year 1893.

D. REARING OF CARROT SEED

Is based on the same principles of selection and regeneration. The typical shape, colour and weight are the chief criteria for the selection. Lastly must be mentioned:

E. THE CULTURE OF NEW VARIETIES OF POTATOES.

They are reared in nurseries which constitute at the same time an experimental field in which they are compared among each other with regard to their productiveness, resistance against disease, and their mealy contents.

My chief aim here is to counteract the diseases by the selection of healthy seed tubers and by the prevention of mixing the varieties by means of careful planting and the removal from the nurseries of any accidental admixtures recognised by their dissimilar flowers.

Besides this, the application of antiseptic liquids for sprinkling the leaves will be experimented this year.

Every year, after the experimenting has been completed, those varieties which proved victorious, are recommended for sale by publishing their results.

This year the nurseries will possess the following of the newer varieties of potatoes: Paulsen's, brought over direct from him in 1891; Simson, Blaue Riesen, Sirius, Viola, Cæsar. Then the earlier American table varieties brought over from Busch of Pomerania, viz: Charles Downing and Rosy Morn. Also of the varieties, formerly brought over from various growers, which have proved worthy of further experimenting, viz: Richter's Imperator, Reichskanzler, Dacota Red, Alcohol, Daber, Aurora, Sutton's Magnum Bonum, Alpha, Cebule Łaciaki, Frühe Nassengrunder, Early Rose, Champion and Anderssen.

DAŃKÓW, ALEXANDER JANASZ.
RUSSIAN POLAND,
March, 1893.

AWARDS.

For the cultivation and improvement of Agricultural Crops, the Dańków Farm has arrived at results which brought it the very highest distinctions at the Shows in Warsaw (which is the only place where the Seeds of this Farm have as yet been exhibited), viz.:

In the Year 1887—

(1) **Diploma of Merit** (higher Award than Gold Medal), for the general production.

(2) **Silver Medal**, for Potatoes.

In the Year 1890—

Silver Medal, for Sugar-Beet Seed.

In the Year 1892, the following Highest Awards—

(1) **Diploma of Merit** (higher Award than Gold Medal), for the general production of Seed-Corn.

(2) **Special Diploma of Merit**, for Sugar-Beet Seed.

(3) **Large Silver Medal** (highest Award given for Wheats), for Dańków Selected Pulawka Wheat.

(4) **Silver Medal** (highest Award given for Ryes), for Dańków Selected Schlanstedt Rye.